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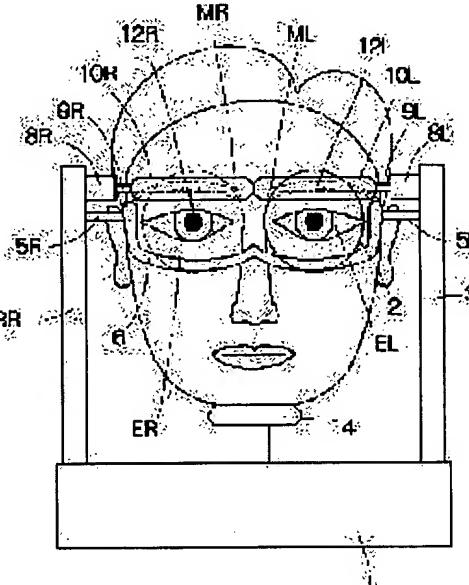
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(54) OPTOMETRY INSTRUMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To facilitate the raising of an eyelid in optometry, shorten an eyelid opening period of time, and reduce burden of a subject by providing a contact part which brings a contact part into contact with an upper part of an examining eye of the subject, and a driving means which drives the contact part upward.

SOLUTION: First, a subject is instructed to bring his face 2R into contact with a contact member 6 and contact members 10L, 10R, and look a target in an optical system through an objective lens with an examining left eye EL. When the face comes into contact with the contact members 10L and 10R, and micro-switches 12L, 12R detect the contact, a detection result of the correct contact is displayed, and a chin holder 4 rises and comes into contact with the chin of the subject, and when the micro-switch detects the contact, the chin holder 4 is fixed. Then, based on a signal of an examining eye location detecting means, the optical system is positioned, e.g. by three-dimensionally driving to the examining left eye EL, and then, an optometry is performed, and motors 8L and 8R move the contact members 10L and 10R upward, and lift the eyelid of the subject in such a manner that trouble may not be generated for the optometry.



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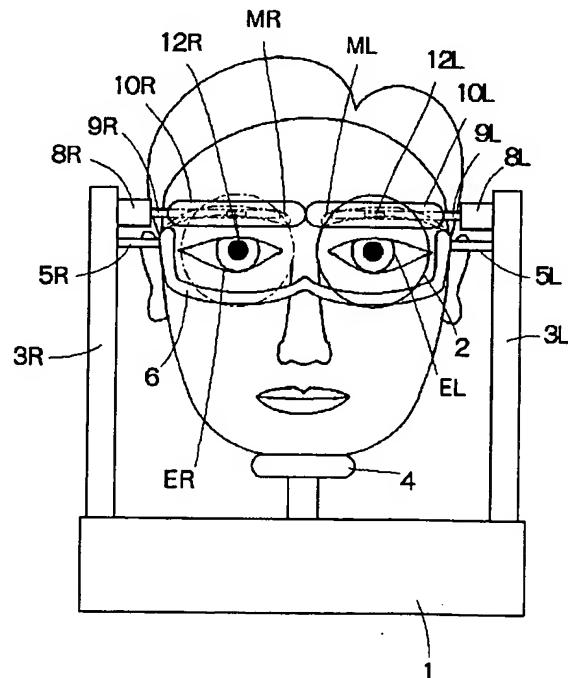
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(54)【発明の名称】 検眼装置

(57)【要約】

【課題】 開眼時間を短縮して被検者への負担を軽減する。

【解決手段】 当接部材6及び当接部材10L、10Rに被検者の顔を当接すると、これをマイクロスイッチ12L、12Rが検知して検知結果が検者に表示される。このとき、モータ8L、8Rは当接部材10L、10Rを上方に動かして検眼に支障が生じないように被検者の瞼を持ち上げる。



【特許請求の範囲】

【請求項 1】 被検者顔の被検眼上部に当接部を当接する当接部材と、前記当接部を上方に駆動する駆動手段とを有することを特徴とする検眼装置。

【請求項 2】 前記当接部は弾性部材で構成する請求項 1 に記載の検眼装置。

【請求項 3】 前記当接部材に被検者顔が当接していることを検知する検知手段を有する請求項 1 に記載の検眼装置。

【請求項 4】 前記当接部材は顔受手段に取り付ける請求項 1 に記載の検眼装置。

【請求項 5】 被検者眼の周囲に当接する当接部材と、位置合わせのために被検眼に対して可動な光学系と、該光学系の対物レンズ及び前記当接部材の間を遮光する伸縮自在な遮光部材とを有することを特徴とする検眼装置。

【請求項 6】 被検眼の位置を測定した後に、自動的に前記光学系を位置合わせ駆動する請求項 5 に記載の検眼装置。

【請求項 7】 前記当接部材の上部に設けた当接部を上方に駆動する駆動手段を有する請求項 5 に記載の検眼装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、眼底カメラや角膜形状測定装置等の検眼装置に関するものである。

【0002】

【従来の技術】 (1) 従来、被検眼の開眼装置としては、特開昭 52-14031 号公報にスプリングを使う装置が開示されている。

【0003】 (2) また、無散瞳眼底カメラの遮光手段として、遮光部材により被検者の頭部を覆う装置や遮光部材を頭部に固定する装置が開示されている。

【0004】

【発明が解決しようとする課題】 (1) しかしながら上述の従来例(1)においては、被検眼に対する開眼時間が長くなり、涙が出て検眼に支障をきたす。また、検者が手で瞼を持ち上げようとする場合には、片手が装置の操作に使えなくなるという欠点がある。更に、大型の装置では検者の手が届かないために助手を必要とする。無散瞳眼底カメラのように自然散瞳するために周囲を暗くすると、手を瞼に当てるのが難しくなるなどの問題点がある。

【0005】 (2) また、上述の従来例(2)の頭部を遮光部材で覆う装置では、被検者の顔が見えないことにより操作性が悪くなるという問題があり、頭部に遮光部材を固定する装置では、操作が煩わしいなどの問題がある。

【0006】 本発明の他の目的は、上述の問題点(1)を解消し、検眼時に容易に瞼を上げることができ、開眼時間を短縮して被検者への負担を軽減した検眼装置を提供

することにある。

【0007】 本発明の他の目的は、上述の問題点(2)を解消し、操作性を損なうことなく簡便に自然散瞳するよう遮光可能な検眼装置を提供することにある。

【0008】

【課題を解決するための手段】 上記目的を達成するための本発明に係る検眼装置は、被検者顔の被検眼上部に当接部を当接する当接部材と、前記当接部を上方に駆動する駆動手段とを有することを特徴とする。

【0009】 また、本発明に係る検眼装置は、被検者眼の周囲に当接する当接部材と、位置合わせのために被検眼に対して可動な光学系と、該光学系の対物レンズ及び前記当接部材の間を遮光する伸縮自在な遮光部材とを有することを特徴とする。

【0010】

【発明の実施の形態】 本発明を図示の実施例に基づいて詳細に説明する。図 1 は第 1 の実施例の無散瞳眼底カメラの顔受け台の正面図、図 2 は平面図を示している。基台 1 上には、被検眼 EL、ER に対する位置合わせ用の駆動部を介して、対物レンズ 2 を含む光学系が載置されており、被検者側には支柱 3 L、3 R 及び顎受け台 4 が固定されている。支柱 3 L、3 R にはそれぞれ固定部材 5 L、5 R が取り付けられており、固定部材 5 L、5 R にはスponジのような容易に弹性変形する当接部材 6 が取り付けられ、当接部材 6 の対物レンズ 2 側には遮光部材として作用する伸縮自在な蛇腹 7 の側面と下面の端部が固定されている。

【0011】 更に、支柱 3 L、3 R にはそれぞれモータ 8 L、8 R が固定されており、これらのモータ 8 L、8 R にはそれぞれ支持部材 9 L、9 R を介して被検者の眉毛周辺に当接する当接部を有するゴム等の弹性素材から成る当接部材 10 L、10 R が取り付けられている。そして、当接部材 10 L、10 R の対物レンズ 2 側は蛇腹 7 の上部に取り付けられており、蛇腹 7 の対物レンズ 2 側の周囲は鏡筒 11 に固定されている。これによって、当接部材 6 及び当接部材 10 L、10 R は、被検者の顔の形状に応じて容易に変形して遮光し、顔の形状に拘らず確実な当接が得られるようになっている。また、支持部材 9 L、9 R の中央部には、それぞれマイクロスイッチ 12 L、12 R が取り付けられている。

【0012】 このような構成により検眼を行う場合には、先ず被検者は当接部材 6 及び当接部材 10 L、10 R に顔を当接して被検左眼 EL により対物レンズ 2 を介して光学系内の視標を見るように指示される。被検者の顔が当接部材 10 L、10 R に当接してマイクロスイッチ 12 L、12 R が当接を検知すると、適正に当接されていることを示す検知結果が検者に表示される。

【0013】 初期位置に下っている顎台 4 が自動的に上昇して被検者の顎に接触し、図示しないマイクロスイッチがこれを検知すると、顎台 4 は停止してその位置で固

定される。なお、頸台4は被検者が頸を離すと所定時間後に元の初期位置にまで降下する。

【0014】光学系に設けられた図示しない被検眼位置検出手段の信号に基づいて、光学系は例えば被検左眼ELに対して三次元的に駆動されて位置合わせが行われ、位置合わせ後に検眼測定が実施される。

【0015】モータ8L、8Rはそれぞれ当接部材10L、10Rを上方に動かすことにより、検眼に支障が生じないように被検者の顔を持ち上げる。なお、当接部材10L、10Rの駆動は、撮影シャッタに連動させまた撮影時に上げて終了すると元に戻すようにすれば、短時間の開眼で済む。また、動作スイッチを検者が操作して動かすようにしてもよい。このように、マイクロスイッチ12L、12Rにより顔の当接を検知して、当接部材10L、10Rを駆動させてるので確実に顔を持ち上げることができる。

【0016】なお、当接部材10L、10Rは顔に当接する当接部を上に動かせばよいので、モータ8L、8Rによって当接部材10L、10Rを上方に動かす代りに回転するようにしてもよい。また、当接部材10L、10Rが当接する顔から、被検左眼ELまでの光路01方向の距離に個人差があっても、蛇腹7を自在に伸縮させて位置調節することができるので、対物レンズ2と被検左眼ELまでの距離を常に一定に保持することが可能である。

【0017】右眼ERを撮影する場合には、光学系を眼幅分ずらして右眼ERの前面に配置する。これにより、蛇腹7は図2に示す点線のように変形し、その後に同様に位置合わせを行ってから検眼測定を実施する。

【0018】このように、被検者眼の周囲に当接部材10L、10Rを当接することにより、最初から光学系の初期位置近傍に被検者眼を持ってくることができるので、被検眼位置検出手段の検出範囲や位置合わせ駆動手段の駆動範囲を広くする必要がなくなる。

【0019】図3は第2の実施例の瞼持ち上げ手段の正面図であり、左右眼用の片側部分のみを示している。顔受け台の支柱13には額当て14が取り付けられ、被検者の眉毛の周辺に当接する当接部材15が支持部材16を介してモータ17に連結され、モータ17は取付部材

18により支柱13に取り付けられている。取付部材18を支柱13に摺動して上下方向に調節することができ、当接部材15を眉毛に位置調整可能とされている。また、当接部材15は当接を確実にするために内部にはばねが設けられており、このばねによって被検者顔方向に付勢されている。そして、使用しない時は被検者顔に当接しない角度に固定できるように構成されている。

【0020】この場合においても、第1の実施例と同様にモータ17を駆動して、当接部材15の当接部を上方に上げることにより瞼を持ち上げることができる。

【0021】なお、本発明は実施例の眼底カメラだけでなく、角膜形状測定装置等他の検眼装置にも同様に適用することができる。

【0022】

【発明の効果】以上説明したように本発明に係る検眼装置は、被検眼の上部に当接する当接部材の当接部を上方に動かして瞼を開くようにしたことにより、検眼時に容易に瞼を持ち上げることができ、開眼時間を短縮して被検者への負担を軽減することができる。

【0023】また、本発明に係る検眼装置は、当接部材と可動な光学系の対物レンズとの間を、伸縮自在な遮光部材で遮光することにより、操作性を損なうことなく簡便に自然散瞳するように遮光することが可能となる。

【図面の簡単な説明】

【図1】第1の実施例の顔受け手段の正面図である。

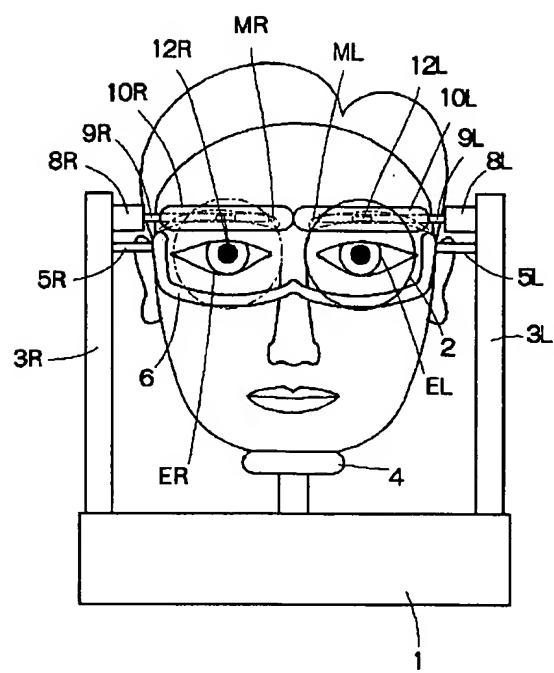
【図2】顔当接部の平面図である。

【図3】第2の実施例の瞼上げ手段の正面図である。

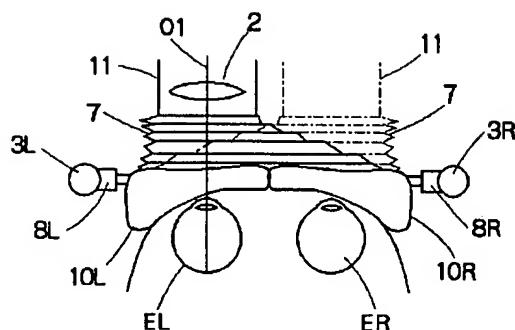
【符号の説明】

- 1 基台
- 2 対物レンズ
- 3L、3R、13 支柱
- 4 頸受け台
- 6、10L、10R、15 当接部材
- 7 蛇腹
- 8L、8R、17 モータ
- 12L、12R マイクロスイッチ
- 14 額当て

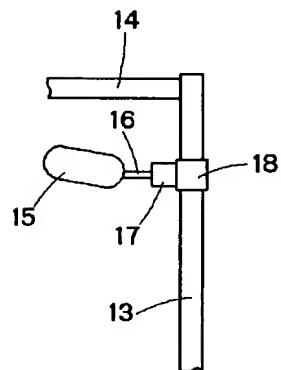
【図1】



【図2】



【図3】



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CLAIMS

[Claim(s)]

[Claim 1] Optometry equipment characterized by having the contact member which contacts the upper part of a subject face examined the eyes in the contact section, and the driving means which drives said contact section up.

[Claim 2] Said contact section is optometry equipment according to claim 1 constituted from an elastic member.

[Claim 3] Optometry equipment according to claim 1 which has a detection means to detect that the subject face is in contact with said contact member.

[Claim 4] Said contact member is optometry equipment according to claim 1 attached in a **** means.

[Claim 5] Optometry equipment characterized by having the contact member which contacts the perimeter of a subject eye, and the elastic protection-from-light member which shades between the objective lens of movable optical system and this optical system, and said contact members to optometry-ed for alignment.

[Claim 6] Optometry equipment according to claim 5 which carries out the alignment drive of said optical system automatically after measuring the location examined the eyes.

[Claim 7] Optometry equipment according to claim 5 which has the driving means which drives up the contact section prepared in the upper part of said contact member.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to optometry equipments, such as a fundus camera and a cornea configuration measuring device.

[0002]

[Description of the Prior Art] (1) As eyelid open equipment examined the eyes, the equipment using a spring is conventionally indicated by JP, 52-14031, A.

[0003] (2) Moreover, the equipment fixed to a head is indicated [member / wrap equipment or / protection-from-light] in the head of the subject by the protection-from-light member as a protection-from-light means of a non-mydriasis fundus camera.

[0004]

[Problem(s) to be Solved by the Invention] (b) However, the above-mentioned conventional example (1) It sets, the eyelid open time amount over optometry-ed becomes long, a tear comes out, and trouble is caused to optometry. Moreover, when a ** person is going to raise an eyelid by hand, there is a fault of it becoming impossible to use one hand for actuation of equipment. Furthermore, with large-sized equipment, since a ** person's hand does not arrive, an assistant is needed. In order to carry out natural mydriasis like a non-mydriasis fundus camera, when a perimeter is made dark, there are troubles, like it becomes difficult to apply a hand to an eyelid.

[0005] (b) Moreover, the above-mentioned conventional example (2) When the face of the subject cannot be seen with wrap equipment in a head with a protection-from-light member, there is a problem that operability worsens and there are problems, like actuation is troublesome with the equipment which fixes a protection-from-light member to a head.

[0006] Other purposes of this invention are above-mentioned trouble (b). It is in offering the optometry equipment which could be solved, could raise the eyelid easily at the time of optometry, shortened eyelid open time amount, and mitigated the burden to the subject.

[0007] Other purposes of this invention are above-mentioned trouble (b).

It is in offering the optometry equipment which can shade so that natural mydriasis may be carried out simple, without canceling and spoiling operability.

[0008]

[Means for Solving the Problem] The optometry equipment concerning this invention for attaining the above-mentioned purpose is characterized by having the contact member which contacts the upper part of a subject face examined the eyes in the contact section, and the driving means which drives said contact section up.

[0009] Moreover, the optometry equipment concerning this invention is characterized by having the contact member which contacts the perimeter of a subject eye, and the elastic protection-from-light member which shades between the objective lens of movable optical system and this optical system, and said contact members to optometry-ed for alignment.

[0010]

[Embodiment of the Invention] This invention is explained to a detail based on the example of illustration. Drawing 1 shows the front view of the face cradle of the non-mydriasis fundus camera of the 1st example, and drawing 2 shows the top view. On the pedestal 1, the optical system containing an objective lens 2 is laid through the mechanical component for alignment to the optometry EL and ER-ed, and Stanchions 3L and 3R and the jaw cradle 4 are being fixed to the subject side. Holddown members 5L and 5R are attached in Stanchions 3L and 3R, respectively, a contact member 6 like sponge which carries out elastic deformation easily is attached in holddown members 5L and 5R, and the edge of the side face of the elastic bellows 7 and an inferior surface of tongue which acts as a protection-from-light member is being fixed to the objective lens 2 side of the contact member 6.

[0011] Furthermore, Motors 8L and 8R are being fixed to Stanchions 3L and 3R, respectively, and the contact members 10L and 10R which change from elastic materials, such as rubber which has the contact section which contacts on the outskirts of a supercilium of the subject through the supporter material 9L and 9R, respectively, to these motors 8L and 8R are attached. And the objective lens 2 side of the contact members 10L and 10R is attached in the upper part of bellows 7, and the perimeter by the side of the objective lens 2 of bellows 7 is being fixed to the lens-barrel 11. According to the configuration of the face of the subject, the contact member 6 and the contact members 10L and 10R deform easily, and are shaded, and positive contact is obtained irrespective of the configuration of a face by this. Moreover, Microswitches 12L and 12R are attached in the center section of the

supporter material 9L and 9R, respectively.

[0012] When examining the eyes by such configuration, it is directed that the subject looks at the target within optical system for a face through an objective lens 2 in contact with the contact member 6 and the contact members 10L and 10R by ***** EL-ed first. The detection result which shows that the face of the subject will be contacted proper if Microswitches 12L and 12R detect contact in contact with the contact members 10L and 10R is displayed on a ** person.

[0013] When the microswitch which the jaw rest 4 currently gone down to the initial valve position goes up automatically, contacts the jaw of the subject, and is not illustrated detects this, a jaw rest 4 stops and is fixed in the location. In addition, a jaw rest 4 will descend after predetermined time even at the original initial valve position, if the subject detaches a jaw.

[0014] Based on the signal of the examined the eyes location detection means which was formed in optical system and which is not illustrated, optical system is driven in three dimensions for example, to ***** EL-ed, alignment is performed, and optometry measurement is carried out after alignment.

[0015] By moving the contact members 10L and 10R up, respectively, Motors 8L and 8R raise the eyelid of the subject so that trouble may not arise in optometry. In addition, the drive of the contact members 10L and 10R can be managed with short-time eyelid open, if it is made to return after making it a photography shutter interlocked with and raising and ending again at the time of photography. Moreover, a ** person operates a switch of operation and you may make it move it. Thus, contact of a face is detected with Microswitches 12L and 12R, and since the contact members 10L and 10R are made to drive, an eyelid can be raised certainly.

[0016] In addition, you may make it rotate them, since the contact members 10L and 10R should just move upwards the contact section which contacts a face instead of moving the contact members 10L and 10R up by Motors 8L and 8R. Moreover, since it can be made to be able to expand and contract free and centering control of the bellows 7 can be carried out even if individual difference is in the distance of the optical-path 01 direction of [from the eyelid to ***** EL-ed] where the contact members 10L and 10R contact, it is possible to always hold uniformly the distance to an objective lens 2 and ***** EL-ed.

[0017] In photoing a right eye ER, optical system is shifted by the interpupillary distance and it arranges in the front face of a right eye ER. Thereby, bellows 7 deforms like the dotted line shown in drawing 2 ,

and optometry measurement is carried out after performing alignment similarly after that.

[0018] Since a subject eye can be brought near the initial valve position of optical system from the beginning by contacting the perimeter of a subject eye in the contact members 10L and 10R, it becomes unnecessary thus, to make large the detection range of an examined the eyes location detection means, and the drive range of an alignment driving means.

[0019] Drawing 3 is the front view of the ***** raising means of the 2nd example, and shows only the single-sided part for right-and-left eyes. The frame reliance 14 is attached in the stanchion 13 of a face cradle, the contact member 15 which contacts around the supercilium of the subject is connected with a motor 17 through the supporter material 16, and the motor 17 is attached in the stanchion 13 by the attachment member 18. It can slide on a stanchion 13, the attachment member 18 can be adjusted in the vertical direction, and justification of the contact member 15 is enabled at the supercilium. Moreover, in order to ensure contact, the spring is prepared in the interior, and the contact member 15 is energized in the direction of a subject face with this spring. And when not using it, it is constituted so that it can fix to the include angle which does not contact a subject face.

[0020] Also in this case, a motor 17 is driven like the 1st example and an eyelid can be raised by raising the contact section of the contact member 15 up.

[0021] In addition, this invention is applicable not only like the fundus camera of an example but other optometry equipments, such as a cornea configuration measuring device.

[0022]

[Effect of the Invention] By moving up the contact section of the contact member which contacts the upper part examined the eyes, and having opened the eyelid, the optometry equipment applied to this invention as explained above can raise an eyelid easily at the time of optometry, can shorten eyelid open time amount, and can mitigate the burden to the subject.

[0023] Moreover, the optometry equipment concerning this invention becomes possible [shading so that natural mydriasis may be carried out simple] by shading between a contact member and the movable objective lenses of optical system by the elastic protection-from-light member, without spoiling operability.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the front view of the face sink stage of the 1st example.

[Drawing 2] It is the top view of the face contact section.

[Drawing 3] It is the front view of the eyelid raising means of the 2nd example.

[Description of Notations]

1 Pedestal

2 Objective Lens

3L, 3R, 13 Stanchion

4 Jaw Cradle

6, 10L, 10R, 15 Contact member

7 Bellows

8L, 8R, 17 Motor

12L, 12R Microswitch

14 Frame Reliance

[Translation done.]

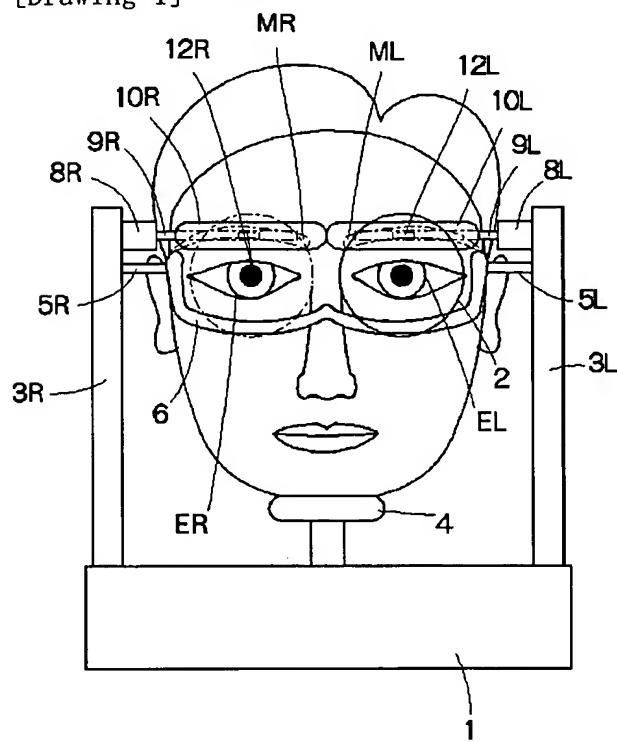
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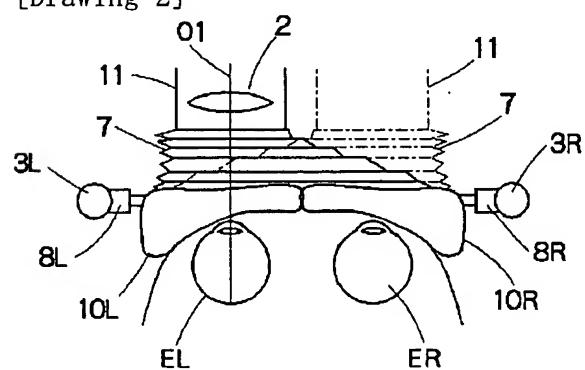
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DRAWINGS

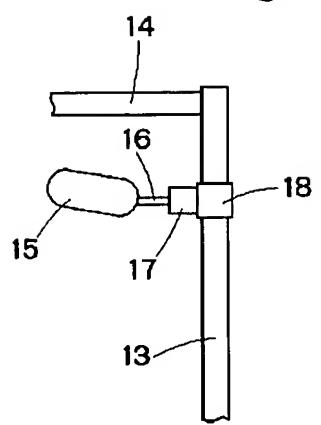
[Drawing 1]



[Drawing 2]



[Drawing 3]



[Translation done.]

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